

Commercial Fuel Cell Operation on ADG

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International Fuel Cells has operated a number of its commercial PC 25 fuel cell power plants at waste water treatment facilities which produce Anerobic Digester Gas (ADG). The first of these was operated at a facility in Yonkers New York. The equipment cost was funded in part by the U.S. EPA Office of Research and Development (ORD) and the New York Power Authority.

The power plant has been in operation for over four years and has utilized ADG cleanup equipment and internal power plant modifications that we developed in cooperation with ORD. The success of the equipment resulted in a number of similar installations in the US, Japan and Europe.

The results of the testing at Yonkers indicated the following points about the PC 25:

- ✓ The carbon dioxide in the ADG is an inert to both the fuel reformer as well as the cell stack. Its only impact is to increase system pressure drop which can be overcome by the use of larger diameter plumbing as well as a specially designed ejector which is used to pump the gas through the system
- ✓ The sulfur removal system performed very well removing sulfur by the Claus process, using a special activated charcoal system. This system operates at ambient pressure eliminating the need for a gas compressor. These compressors can result in maintenance issues
- ✓ The internal PC 25 modifications implemented to remove organic halides from the ADG also performed well
- ✓ Emissions from the PC 25, operating on ADG, were measured and shown to be equivalent to those from a natural gas unit
- ✓ In the event of scheduled or unscheduled maintenance it is beneficial to have a trained staff close to the site. KeySpan Energy performed this task under contract to IFC

During the course of this testing a number of issues, associated with ADG use, were identified and corrective actions taken at future ADG installations. Among these are:

- The supply pressure of ADG typically varies over the course of the year. This variation is due to a variety of factors including seasonality and the presence of liquid water in the supply lines. The corrective actions include the use of a small boost fan in the ADG supply line to insure adequate pressure to the fuel cell. In addition the supply line should be continually drained of water to minimize gas pressure drops in those lines
- The methane content of the ADG as well as its surety of supply can typically vary for reasons such as seasonality, storms and plant maintenance activities. Using natural gas as an alternative fuel can minimize the impacts of these items. The PC 25 , designed for ADG, now has the capability to switch automatically to natural gas when the supply of ADFG is not adequate

This paper will discuss further the results of the testing at Yonkers as well as “lessons learned” which been implemented at other PC 25 ADG sites.